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4.1 INTRODUCTION

IID proposes to build, own and operate the 93-MW Project near the Town of Niland, adjacent to IID's existing Niland Substation. The Project is intended to serve growing electrical loads, primarily peak summer demands.

The following analysis is intended to evaluate the potential of transmission impacts during the construction and operational phases of this Project. This section discusses the transmission interconnection between the Project and the existing electrical grid. An SIS has been conducted to reflect any impacts of the Project interconnection and operation on the electrical grid.

4.2 TRANSMISSION SYSTEM

The Project interconnects at 92 kV with the existing Niland Substation located on the southwest corner of the property (see Figure 2.2-2, Site Plan and Utility Interface). The Project includes a generation switchyard having a single-breaker, single-bus configuration. An overhead cable will connect the high-voltage side of the GSU transformers to the generation switchyard. An overhead radial transmission line connects the generation switchyard to the Niland Substation.

The existing substation 161/92-kV transformer will be relocated to allow space on the 92-kV bus for the 92-kV interconnect from the generation substation. The existing eastward-running 13-kV distribution line located directly north of the substation will be undergrounded along the south side of the Project Site.

4.3 INTERCONNECTION SYSTEM IMPACT STUDY

IID commissioned an SIS to investigate the addition of two nominal 50-MW LM6000-peaking generators connected to the existing IID Niland Substation by summer 2008. The study investigated the impact of the proposed generation interconnected to the Niland 92-kV Substation. Sensitivity cases were conducted to review (1) any impacts associated with the maximum existing IID generation and the new Project, and (2) generation proposed in the interconnection queue to the IID transmission system.

The SIS included power flow, stability, and short-circuit impacts to both the IID transmission system and the interconnected transmission system. The Project, proposed as a peaking facility, was scheduled directly to IID as a network resource (i.e., displacing other less efficient network resources) serving IID loads.

The interconnection of the proposed generating facility to the Niland 92-kV transmission system was found to have a beneficial impact on the IID transmission system. The addition of the facility had the effect of substantially reducing the impact of the Blythe generation loading on the Niland 161/92-kV transformer under continuous and contingency conditions. The tie-line flow impact was minimal, showing that neighboring utilities would not be impacted adversely by the addition of the Project.

The stability analysis modeling showed that there were no significant impacts to IID or neighboring transmission systems.

The short-circuit analysis found that no interrupting rating violations would occur due to the increase in short-circuit duties resulting from the generator addition. The impact of the facility on short-circuit levels at the interconnection busses was minimal and no criteria violations are anticipated on neighboring utility systems.

In summary, based upon the results of the system impact study, the Project configuration will not adversely affect the grid.

4.4 TRANSMISSION LINE SAFETY AND NUISANCE

This section discusses safety and nuisance issues associated with the electrical interconnection of the Project.

4.4.1 Aviation Safety

Federal Aviation Administration (FAA) Regulations, Part 77, establish standards for determining obstructions in navigable airspace and set forth requirements for notification of construction. These regulations require FAA notification for any construction over 200 feet high (above ground level). In addition, notification is required if the obstruction is lower than specified heights and falls within any restricted airspace in the approaches to airports. For airports with runways longer than 3,200 feet, the restricted space extends 20,000 feet (3.3 nautical miles) from the runway. For airports with runways less than 3,200 feet, the restricted space extends 10,000 feet (1.7 nautical miles). For heliports, the restricted space extends 5,000 feet (0.8 nautical mile).

Since the new structures will be less than 200 feet tall, and there are no public or military airports or heliports near enough for the Project Site to fall within restricted airspace, an FAA air navigation hazard review will not be necessary. The new interconnection structures will pose no threat to aviation safety.

4.4.2 Electrical Clearances

High-voltage overhead transmission lines are composed of bare conductors connected to supporting structures by means of porcelain, glass, or polymer insulators. The air surrounding the energized conductor acts as the insulating medium. Maintaining sufficient clearances, or air space, around the conductors to protect the public and utility workers is paramount to the safe operation of the line. The safety clearance required around the conductors is determined by normal operating voltages, conductor temperatures, short-term abnormal voltages, windblown swinging conductors, contamination of the insulators, clearances for workers, and clearances for public safety. Minimum clearances are specified in the California Public Utility Commission (CPUC) General Order (GO) 95. Typically, clearances are specified for the following:

- Distances between energized conductors.
- Distances between energized conductors and supporting structures.
- Distances between energized conductors and other power or communication wires on the same supporting structure, or between other power or communication wires above or below the conductors.

- Distances from energized conductors to the ground and other features such as roadways, railroads, driveways, parking lots, navigable waterways, airports, etc.
- Distances from energized conductors and buildings and signs.
- Distances from energized conductors and other parallel power lines.

The Project design will satisfy all of the above criteria.

4.4.3 Audible Noise and Radio Interference

Corona may result in the production of audible noise from a transmission line. Corona is a function of the voltage of the line, the diameter of the conductor, and the condition of the conductor and suspension hardware. The electric field gradient is the rate at which the electric field changes and is directly related to the line voltage. Corona typically becomes a concern for transmission lines having voltages of 345 kV or more. Since the Project will be connected at 92 kV, it is expected that no corona-related design issues will be encountered, and that the construction and operation of the Project will not result in any significant increase in audible noise or radio interference.

4.4.4 Induced Currents and Hazardous/Nuisance Shocks

The 92-kV transmission interconnection will be designed and constructed in conformance with CPUC GO95 and Title 8 California Code of Regulations (CCR) 2700 requirements. Therefore, hazardous shocks are unlikely to occur as a result of Project construction or operation. To preclude concerns with regards to the parallel routing of the Southern California Gas lateral pipeline and the existing IID transmission circuits, the pipeline will be routed on the south side of Beal Road. This separation and any required mitigation to the pipelines will be sufficient to ensure protection of the pipeline.

4.4.5 Electric and Magnetic Fields

Operating power lines, like the energized components of electrical motors, home wiring, lighting, and all other electrical appliances, produce electromagnetic field (EMF). EMF produced by the AC electrical power system in the United States has a frequency of 60 Hertz (Hz), meaning that the intensity and orientation of the field changes 60 times per second.

Considerable research has been conducted over the past 30 years on the possible biological and human health effects from EMF. This research has produced many studies that offer no uniform conclusions about potential harm of long-term exposure to EMF. In the absence of conclusive or evocative evidence, California has chosen not to specify maximum acceptable levels of EMF. Instead, California mandates a program of prudent avoidance whereby EMF exposure to the public is minimized by encouraging electric utilities to use low-cost techniques to reduce EMF levels. The construction and operation of the Project will not result in any significant increase in EMF levels.

4.5 APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

LORS for design and construction, electric and magnetic fields, hazardous shock, communications interference, aviation safety and fire hazard are presented in the sections below.

4.5.1 Design and Construction

Table 4.5-1, Design and Construction LORS, lists the applicable LORS for the design and construction of transmission lines and substations.

**TABLE 4.5-1
DESIGN AND CONSTRUCTION LORS**

LORS	Applicability
Title 8 CCR, Section 2700 <i>et seq.</i> “High Voltage Electrical Safety Orders”	Establishes essential requirements and minimum standards for installation, operation, and maintenance of electrical installation and equipment to provide practical safety and freedom from danger.
GO-52, CPUC, “Construction and Operation of Power and Communication Lines”	Applies to the design of facilities to provide or mitigate inductive interference.
ANSI/IEEE 693, “IEEE Recommended Practices for Seismic Design of Substations”	Recommends design and construction practices.
IEEE 1119, “IEEE Guide for Fence Safety Clearances in Electric-Supply Stations”	Recommends clearance practices to protect persons outside the facility from electric shock.
IEEE 998, “Direct Lightning Stroke Shielding of Substations”	Recommends protections for electrical system from direct lightning strikes.
IEEE 980, “Containment of Oil Spills for Substations”	Recommends preventions for release of fluids into the environment.

Notes:

ANSI = American National Standards Institute

CCR = California Code of Regulations

CPUC = California Public Utilities Commission

IEEE = Institute of Electrical & Electronics Engineers

LORS = laws, ordinances, regulations, and standards

4.5.2 Electric and Magnetic Fields

The applicable LORS pertaining to EMF interference are tabulated in Table 4.5-2, Electric and Magnetic Field LORS.

**TABLE 4.5-2
ELECTRIC AND MAGNETIC FIELD LORS**

LORS	Applicability
Decision 93-11-013, CPUC	CPUC position on EMF reduction.
GO-131-D, CPUC, “Rules for Planning and Construction of Electric Generation, Line, and Substation Facilities in California”	CPUC construction application requirements, including requirements related to EMF reduction.
ANSI/IEEE 644-1994, “Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines”	Standard procedure for measuring EMF from an electric line that is in service.

Notes:

AC = alternating current

ANSI = American National Standards Institute

EMF = electromagnetic field

IEEE = Institute of Electrical & Electronics Engineers

LORS = laws, ordinances, regulations, and standards

4.5.3 Hazardous Shock

Table 4.5-3, Hazardous Shock LORS, lists LORS regarding hazardous shock protection that apply to the Project.

**TABLE 4.5-3
HAZARDOUS SHOCK LORS**

LORS	Applicability
8 CCR 2700 <i>et seq.</i> “High Voltage Electrical Safety Orders”	Establishes essential requirements and minimum standards for installation, operation, and maintenance of electrical equipment to provide practical safety and freedom from danger.
ANSI/IEEE 80, “IEEE Guide for Safety in AC Substation Grounding”	Presents guidelines for assuring safety through proper grounding of AC outdoor substations.
NESC, ANSI C2, Section 9, Article 92, Paragraph E; Article 93, Paragraph C	Covers grounding methods for electrical supply and communications facilities.

Notes:

AC = alternating current

ANSI = American National Standards Institute

CCR = California Code of Regulations

IEEE = Institute of Electrical & Electronics Engineers

LORS = laws, ordinances, regulations, and standards

NESC = National Electrical Safety Code

4.5.4 Communications Interference

The applicable LORS pertaining to communication interference are tabulated in Table 4.5-4, Communications Interference LORS.

**TABLE 4.5-4
COMMUNICATIONS INTERFERENCE LORS**

LORS	Applicability
47 CFR 15.25, “Operating Requirements, Incidental Radiation”	Prohibits operations of any device emitting incidental radiation that causes interference to communications; the regulation also requires mitigation for any device that causes interference.
GO-52, CPUC	Covers all aspects of the construction, operation, and maintenance of power and communication lines and specifically applies to the prevention or mitigation of inductive interference.
CEC staff, Radio Interference and Television Interference (RI-TVI) Criteria (Kern River Cogeneration) Project 82-AFC-2, Final Decision, Compliance Plan 13-7	Prescribes the CEC’s RI-TVI mitigation requirements, developed and adopted by the CEC in past citing cases.

Notes:

CEC = California Energy Commission

CFR = Code of Federal Regulations

CPUC = California Public Utilities Commission

LORS = laws, ordinances, regulations, and standards

4.5.5 Aviation Safety

Table 4.5-5, Aviation Safety LORS, lists the aviation safety LORS that may apply to the proposed construction and operation of the Project.

**TABLE 4.5-5
AVIATION SAFETY LORS**

LORS	Applicability
Title 14 CFR, Part 77, “Objects Affecting Navigable Airspace”	Describes the criteria used to determine whether a “Notice of Proposed Construction or Alteration” (NPCA, FAA Form 7460-1) is required for potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, “Obstruction Marking and Lighting”	Describes the FAA standards for marking and lighting of obstructions as identified by FAA Regulations Part 77.
PUC, Sections 21656-21660	Discusses the permit requirements for construction of possible obstructions in the vicinity of aircraft landing areas, in navigable airspace, and near the boundary of airports.

Notes:

CFR = Code of Federal Regulations

FAA = Federal Aviation Administration

LORS = laws, ordinances, regulations, and standards

NPCA = National Parks Conservation Association

PUC = Public Utilities Commission

4.5.6 Fire Hazards

Table 4.5-6, Fire Hazard LORS, tabulates the LORS governing fire hazard protection for the Project.

**TABLE 4.5-6
FIRE HAZARD LORS**

LORS	Applicability
14 CCR Sections 1250-1258, "Fire Prevention Standards for Electric Utilities"	Provides specific exemptions from electric pole and tower firebreak and electric conductor clearance standards, and specifies when and where standards apply.
ANSI/IEEE 80, "IEEE Guide for Safety in AC Substation Grounding"	Presents guidelines for assuring safety through proper grounding of AC outdoor substations.
GO-95, CPUC, "Rules for Overhead Electric Line Construction," Section 35	CPUC rule covers all aspects of design, construction, operation, and maintenance of electrical transmission line and fire safety (hazards).

Notes:

AC = alternating current

ANSI = American National Standards Institute

CCR = California Code of Regulations

CPUC = California Public Utilities Commission

IEEE = Institute of Electrical & Electronics Engineers

LORS = laws, ordinances, regulations, and standards

